CLAIMS

1/ Apparatus for generating ions in a gaseous medium, the apparatus being characterized in that it comprises:

- one or more needles (40, 85, 86, 87) each presenting a shank (40.1) and an emitter end (40.2);

- a sheath (42) of composite material comprising a glass fiber reinforced unsaturated polyester surrounding the shank (40.1) of each needle; and

- means (44, 46, 70, 72, 74, 76, 78, 80) for applying a voltage between two portions of the shank of each needle.

2/ Apparatus according to claim 1, in which the sheath (42) is of cylindrical outside shape.

Sub A1

3/ Apparatus according to claim 1 or 2, in which one or more needles are made of a material selected from: titanium, platinum, a compound of titanium and platinum, silver, stainless steel, brass, nickel, and an alloy of these materials.

4/ Apparatus for generating ions in a gaseous medium, the apparatus being characterized in that it comprises:

- one or more needles (40, 85, 86, 87) each having a shank (40.1) and an emitter end (40.2), each needle being made of a material selected from titanium, platinum, and a compound of titanium and platinum;

- a sheath (42) of material comprising glass fiber reinforced unsaturated polyester which surrounds the shank (40.1) of each needle; and

- means (44, 46, 70, 72, 74, 76, 78, 80) for applying a voltage between two portions of the shank of each needle.

Sub A2

5/ Apparatus according to any one of claims 1 to 4, in which each emitter end (40.2) is covered in a film of gold.

Sub A2

6/ Apparatus according to any one of claims 1 to 5, in which the composite material has a glass content lying in the range 50% to 90% by weight relative to the total weight of the material.

7/ Apparatus according to any one of claims 1 to 6, in which the composite material also includes mica.

8/ Apparatus according to any one of claims 1 to 7, in which each needle (40) is held firmly in the sheath (42) which surrounds it without any possibility of rubbing or displacement.

9/ Apparatus according to any one of claims 1 to 8, in which the means for applying a voltage between two portions of the shank of each needle comprise first and second plates (44, 46) situated at two different heights along each sheath of composite material, and means (70, 72, 74, 76, 78, 80) for applying a high voltage between said two plates.

10/ Apparatus according to claim 9, in which one of the two plates (44) forms a support for each needle (40) which is held firmly without any possibility of rubbing.

11/ Apparatus according to claim 10, in which one of the two plates is provided with an integrated high voltage source (70, 72, 74, 76, 78, 80).

12/ Apparatus according to claim 11, in which the integrated high voltage source has means for producing a first voltage (V1), and means for multiplying said first voltage so as to obtain the desired high voltage (V2).

Sub A3

13/ Apparatus according to claim 11 or 12, in which the high voltage source is made using surface mount components (SMCs).

Sub A3

14/ Apparatus according to any one of claims 1 to 13, having a plurality of needles, each needle being surrounded by a sheath, the sheaths being interconnected in pairs.

15/ Apparatus according to claim 14, in which the sheaths are coupled together in pairs by means of webs (60) of material identical to the material of the sheaths.

16/ Apparatus according to claim 15, in which the two sheaths and the plate of a pair are formed as a single unit.

Sub A4

17/ Apparatus according to any one of claims 1 to 16, in which the apparatus is incorporated in a housing (51) made of plastics material.

18/ Apparatus according to clam 17, in which the plastics material has all traces of metal removed therefrom.

Sub A5

19/ Apparatus according to claim 17 or 18, in which the plastics material has resistivity lying in the range 10^4 Ω.m to 10^{12} Ω.m.

20/ Apparatus according to any one of claims 17 to 19, in which the inside of the housing is treated with antistatic paint.

21/ Apparatus according to any one of claims 17 to 19, in which the material constituting the housing is treated with additives implanting antistatic properties thereto.

22/ Apparatus according to any one of claims 17 to 21, in which the housing comprises two shells with screw wells (56).

23/ Apparatus according to claim 22, further including means for closing the screw wells (56) after the two shells have been assembled together.

24/ Apparatus according to any one of claims 1 to 23, further including regulator means (82, 94) for regulating the voltage applied between the two portions of the shank of each needle.

25/ Apparatus according to claim 24, in which the voltage regulator means comprise means (82) for measuring the quantity of ions produced by the apparatus, means (94) for comparing said quantity of ions produced with an ideal quantity of ions required, and means for varying the applied voltage as a function of the result of the comparison between the quantity of ions produced and the quantity of ions required.

26/ Apparatus according to claim 25, in which the ideal quantity of ions required is determined on the basis of a corrected volume which takes account of the real volume of the premises in which the ion generator apparatus is installed, and also of the content of the premises and/or its surroundings.

27/ Apparatus according to claim 24 or 25, in which the means for varying the applied voltage are automatic means or manual means.

28/ Apparatus according to any one of claims 24 to 27, including an ion detector, itself comprising:

- means (112) for sensing ions or a quantity of ions in an atmosphere;
- indicator means (114, 122) for indicating the presence of ions; and

- switch means (100-110) for switching the indicator means as a function of the quantity of ions sensed by the ion sensor means (112).

29/ Apparatus according to claim 28, in which the switch means (100-110) comprise a transistor (104) biased by a voltage source when switching occurs.

30/ The use of one or more ionizer apparatuses according to any one of claims 1 to 29 in the manufacture of fixed or moving living quarters for animals.

31/ The use of one or more ionizer apparatuses according to any one of claims 1 to 29 in making an animal cage.

32/ A use according to claim 31, in which the cage is made of plastics material or of composite polymer material.

33/ The use of a receptacle provided with apparatus according to any one of claims 1 to 29 for making a device for storing foodstuffs.

34/ A use according to claim 33, in which the receptacle is a refrigerator, or a refrigerated chest, or a display window.

35/ The use of ionization apparatus according to any one of claims 1 to 29, for making a transport device.

36/ A use according to claim 35, in which the transport device is a motor vehicle, a rail vehicle, or an aircraft.

37/ A method of vacuum-packaging foodstuffs, the method comprising the following steps:

Sub A8

- producing one or more negative oxygen ion fluxes by means of apparatus according to any one of claims 1 to 29;

- subjecting the foodstuffs for packaging to said ion flux; an

- vacuum-packaging the foodstuffs.

38/ A method of storing foodstuffs in which the foodstuffs are placed in premises fitted with ionizer apparatus according to any one of claims 1 to 29, and in which a flux of negative ions is produced by means of said ionizer apparatus.

39/ A method of storing foodstuffs according to claim 38, in which the foodstuffs are meat or fish or vegetables.

Sub A9

40/ A method of treating the atmosphere in premises, in which use is made of apparatus according to any one of claims 1 to 29.

41/ A method according to claim 40, in which the premises is a gray or white airlock, or a clean room, or a computer room, or a room fitted with computer or electronic equipment, or a hospital ward or theatre.

42/ A method according to claim 40, in which the premises is a unit in which animals are reared.

43/ A method according to claim 40, in which the premises is a zone or workshop for producing food.